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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/718,653	11/24/2003	Kazuo Teshirogi	032131	1182

38834 7590 03/27/2008

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EXAMINER	
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ART UNIT	PAPER NUMBER
1791	

MAIL DATE	DELIVERY MODE
03/27/2008	PAPER

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/718,653
Filing Date: November 24, 2003
Appellant(s): TESHIROGI ET AL.

Michael Caridi
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed January 17, 2008 appealing from the Office action mailed October 17, 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

JP 54-124968	NAGATOMI et al.	9-1979
JP 6-104317	INADA et al.	4-1994
3,749,621	SHOFFNER	7-1973
3,040,489	DA COSTA	6-1962
5,051,475	TSUNASHIMA et al.	9-1991
5,336,703	HOMMA et al.	8-1994
3,501,128	POOL	3-1970

Appellants Specification Pages 1-3 THE ADMITTED PRIOR ART

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-3 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagatomi et al. (JP 54124968 and the abstract) in view of either one of Inada et al. (JP 06104317 and the abstract) or Shoffner (U.S. Patent 3,749,621), Da Costa (U.S. Patent 3,040,489), either one of Tsunashima et al. (U.S. Patent 5,051,475) or Homma et al. (U.S. Patent 5,336,703), and optionally Pool (U.S. Patent 3,501,128).

Nagatomi et al. disclose a method of manufacturing a semiconductor element comprising providing a semiconductor substrate (3 of Figure 3), placing an adhesive film (4 of Figure 3) on a surface of the semiconductor substrate, providing a cylindrical roller (15 of Figure 3) having a heat-generating part (15c of Figure 3) in a central portion of the roller extending in an axial direction of the roller, pressing the roller heated to a laminating temperature onto the adhesive film, rolling the roller the length of the adhesive film to laminate the adhesive film to the

semiconductor substrate by heat only from the heat-generating part, and dividing the semiconductor substrate into a plurality of semiconductor elements (See the abstract). Nagatomi et al. do not disclose the cylindrical roller is formed of metal having an outermost layer of elastically deformable fluoride resin provided thereon. Inada et al. directed to forming a TAB tape, i.e. a tape automated bonding tape which is used to adhere semiconductor elements, teaches pressing the tape with a heated pressing roll comprising a metal body with an outer Teflon, i.e. fluoride resin, layer thereon such that the adhesive of the tape does not stick to the roller (See the abstract). Shoffner discloses a pressing roller wherein the roller comprises a metal body with an outer Teflon, i.e. fluoride resin, layer thereon, e.g. having a thickness of 0.01 to 0.09 in., such that the roller is free of adhesion to other surfaces and is resistant to corrosion (Column 1, lines 43-50 and Column 3, lines 74-75 and Column 4, lines 1-5 and Column 5, lines 21-23). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use as the cylindrical roller taught by Nagatomi et al. the metal cylindrical roller with an outer fluoride resin layer as shown by either one of Inada et al. or Shoffner to laminate the adhesive film without the adhesive film sticking to the roller and the roller being resistant to corrosion.

Regarding the limitation of the "roller having a diameter of about 20-50 mm", Nagatomi et al. do not teach any specific diameter for the roller, it being noted Nagatomi et al. are not limited to any particular diameter. Da Costa discloses a cylindrical roller for rolling the length of a film covering a semiconductor substrate for dividing the semiconductor substrate into a plurality of semiconductor elements wherein the roller has a diameter of 32 mm (Figure 4 and Column 2, lines 55-68 and Column 6, lines 18-21). Absent any unexpected results, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use as

the diameter of the roller taught by Nagatomi et al. as modified by either one of Inada et al. or Shoffner those known in the art as capable for pressing the length of a film covering a semiconductor substrate such as that shown by Da Costa.

Regarding the limitation of an "elastically deformable resin layer" and "absorbing unevenness of the outer surface of the roller and unevenness of a surface of the film by elastic deformation of the elastically deformable resin", it is noted Teflon is well taken in the art as an elastically deformable material as shown by Pool (Column 3, lines 33-35). One of ordinary skill in the art at the time the invention was made would have readily appreciated that the outer layer of Teflon taught by Nagatomi et al. as modified by either one of Inada et al. or Shoffner is elastically deformable as optionally shown by Pool such that the layer would absorb unevenness of the outer surface of the roller and unevenness of a surface of the film by elastic deformation as the elastically deformable outer layer including its thickness is consistent and in agreement with appellants claims and specification (See page 15, lines 16-19 and 34-37) as suitable for absorbing unevenness in this manner.

Regarding the limitation of the "roller presses the film with a pressing load of 10-20N", Nagatomi et al. do not specify any particular pressing load. Nagatomi et al. do not require any particular pressing load only teaching pressure bonding the adhesive film with the roller by hand. It is well taken in the art of pressure bonding an adhesive substrate such as a tape to another substrate with a hand roller that a pressing load of up to 50 N may be applied as shown by either one of Tsunashima et al. or Homma et al. (Column 8, lines 40-43 of Tsunashima et al. and Column 13, lines 40-44 of Homma et al.). Absent any unexpected results, it would have been obvious to one of ordinary skill in the art at the time the invention was made to experimentally

determine the pressing load for the roller in Nagatomi et al. as modified by either one of Inada et al. or Shoffner as a function of adequately applying force for pressure bonding the adhesive film as doing so would have required nothing more than ordinary skill and routine experimentation, it being noted the claimed pressing load is easily achieved by a hand roller as shown by either one of Tsunashima et al. or Homma et al.

Regarding the limitation of "wherein the heat-generating part is heated to about 200 °C" and "about 5 seconds after the roller is pressed to an area of the principal surface of the semiconductor substrate said area returns to a temperature about equal to the area's temperature prior to contact with the roller", Nagatomi et al. teach the heat-generating part is heated to between 50 and 300 °C and specifically depict about 200 °C (6 of Figure 5). Additionally, as the materials and method taught by Nagatomi et al. as modified by either one of Inada et al. or Shoffner, Da Costa, either one of Tsunashima et al. or Homma et al., and optionally Pool are consistent and in agreement with that claimed and described by appellants as resulting in about 5 seconds after the roller is pressed to an area of the principal surface of the semiconductor substrate said area returns to a temperature about equal to the area's temperature prior to contact with the roller one of ordinary skill in the art at the time the invention was made would have readily expected the method taught by Nagatomi et al. as modified by either one of Inada et al. or Shoffner, Da Costa, either one of Tsunashima et al. or Homma et al., and optionally Pool to result in the same. In the event it is shown the depiction of about 200 °C in Nagatomi et al. is not a specific disclosure the following rejection would apply. It would have been obvious to one of ordinary skill in the art at the time the invention was made to experimentally determine the heat temperature of the heat-generating part in Nagatomi et al. as modified by either one of Inada et

al. or Shoffner, Da Costa, either one of Tsunashima et al. or Homma et al., and optionally Pool with the range suggested by Nagatomi et al. as a function of the specific materials used as doing so would have required nothing more than ordinary skill and routine experimentation wherein about 200 °C would have readily been expected as a value lying in the middle of the range suggested by Nagatomi et al.

Regarding claim 18, Nagatomi et al. do not disclose the difference in temperature between the heat generating part and the film during rolling is about 20 °C. However, there is intrinsically a temperature difference between the heat generating part and the film as the outer layers of roller located between the heat generating part and the film will absorb heat. Absent any unexpected results, it would have been obvious to one of ordinary skill in the art at the time the invention was made to experimentally determine the temperature difference between the heat generating part and the film in Nagatomi et al. as modified by either one of Inada et al. or Shoffner as a function of supplying enough laminating heat to the film while accounting for the heat absorption of the outer layers of the rollers as doing so would have required nothing more than ordinary skill and routine experimentation.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nagatomi et al., either one of Inada et al. or Shoffner, Da Costa, either one of Tsunashima et al. or Homma et al., and optionally Pool as applied to claims 1-3 and 18 above, and further, in view of the admitted prior art (Specification pages 1-3).

Nagatomi et al., either one of Inada et al. or Shoffner, Da Costa, either one of Tsunashima et al. or Homma et al., and optionally Pool as described above teach all of the limitations in claim 15 except for a specific teaching of thinning the adhering surface of the

semiconductor substrate. The admitted prior art is directed to laminating an adhesive film onto a surface of a semiconductor substrate wherein the semiconductor substrate surface is thinned, e.g. by grinding, prior to lamination (Figure 1 and Page 1, lines 26-33 and Page 2, lines 31-37 and Page 3, lines 1-11). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in Nagatomi et al. as modified by either one of Inada et al. or Shoffner, Da Costa, either one of Tsunashima et al. or Homma et al., and optionally Pool to include a step of thinning the adhering surface of the semiconductor substrate prior to lamination as shown by the admitted prior art to form semiconductor elements having a reduced thickness.

(10) Response to Argument

> Appellants argue, "However, there is no cited teaching from any of the references as to why one of skill in the art would make the combination to utilize a rolling method whereby about 5 seconds after the roller is pressed to an area of the principal surface of the semiconductor substrate the area returns to a temperature about equal to the area's temperature prior to contact with the roller. In other words, there is no reason provided by the Examiner why the skilled artisan would make the combination in the first place to derive the "readily expected" result.".

Motivation for modifying Nagatomi et al. with either one of Inada et al. or Shoffner, Da Costa, either one of Tsunashima et al. or Homma et al., and optionally Pool is fully set forth in the rejection to which appellants have not specifically directed any arguments. Nagatomi et al. as modified by either one of Inada et al. or Shoffner, Da Costa, either one of Tsunashima et al. or Homma et al., and optionally Pool teach laminating a film on a principal surface of a semiconductor substrate using a heated rotatable roller formed of the claimed materials, having the claimed diameter, and heated and pressed under the claimed temperature and pressing load such that absent a showing otherwise one of ordinary skill in the art would readily expect that the limitation of "about 5 seconds after the roller is pressed to an area of the principle surface of the

semiconductor substrate said area returns to a temperature about equal to the area's temperature prior to contact with the roller" occurs in the method taught by references the same as that which occurs in appellants claimed method as both are consistent and in agreement with each other as resulting in the same.

> Appellants further argue, "There is no reason whereby one of skill in the art would have combined the references to derive the current invention. ***Nagatomi et al.*** was filed in March 23, 1978. The wafers in 1978 were very thick so that there was no need to consider the cracking of the semiconductor substrate which is caused by the thermal stress. ***Nagatomi et al.*** considers only the appropriate adsorptive property of the sheet to the semiconductor substrate and the evenness of the surface of the semiconductor substrate. One of skill in the art at the time the present invention was made would readily understand this inapplicability of the reference to modern semiconductor wafers.".

The claims are not commensurate in scope with this argument. The claims do not require the semiconductor substrate have any particular thickness.

> Apellants further argue, "As shown in FIG. 1 to 5 in ***Nagatomi et al.,*** the roller of ***Nagatomi et al.*** is controlled by manual not automatically. The manual controlled roller in ***Nagatomi et al.*** cannot control the pressing load to maintain 10-20N. Since ***Nagatomi et al.*** does not need to consider thermal stress, ***Nagatomi et al.*** does not need to consider the pressing load of the roller.".

The claims are not commensurate in scope with this argument. The claims do not require the roller is controlled, the roller is automatic, or the roller maintain a pressing load of 10-20N. The claims only require "wherein said roller presses the film with a pressing load of 10-20 N". Nagatomi et al. as modified by either one of Tsunashima et al. or Homma et al. manually press the roller at a pressing load up to 50 N, i.e. wherein said roller presses the film with a pressing load of 0 to 50 N including through 10 to 20 N, it being further set forth that the pressing load be experimentally determined as a function of that which is adequate to perform the lamination the manual pressing taught by Nagatomi et al. clearly capable of the claimed pressures as evidenced by Tsunashima et al. or Homma et al. Appellants have shown no unexpected results for the

claimed pressing load other than the claimed load is that adequate for lamination, and appellants have **not** shown via argument or actual disclosure in the specification that controlling the pressing load to maintain 10-20 N as argued controls thermal stress or is required to achieve "about 5 seconds after the roller is pressed to an area of the principle surface of the semiconductor substrate said area returns to a temperature about equal to the area's temperature prior to contact with the roller".

> Appellants further argue, "***Nagatomi et al.*** does not need to consider the pressing load of the roller. Still further, as evidenced by the figures of ***Nagatomi et al.*** the ratio of the roller size to wafer size is very small. In other words, the roller covers a large area of the wafer at any one time. Clearly in such a configuration, thermal difference of one area of the wafer as compared to another is not a concern.".

The claims are not commensurate in scope with this argument. The claims do not require the ratio of the roller size to wafer size.

> Appellants further argue, "To the contrary, in the modem semiconductor manufacturing process, the wafers are very thin. Therefore, the present invention needs to consider the cracking of the semiconductor substrate which is caused by the thermal stress due to differences in temperature between different areas of the wafer. Since the present invention is subject to thermal stress, the present invention also needs to consider the pressing load of the roller. The present invention according to claims 1-3 and 18 applies the non-manual control of the pressing load so that the pressing load maintains 10-20N. Therefore the ratio of the roller size to wafer size is very large. Under the non-manual pressure control of the pressing load, as shown in FIG. 7, the present invention teaches that "about 5 seconds after the roller is pressed to an area of the principal surface of the semiconductor substrate said area returns to a temperature about equal to the area's temperature prior to contact with the roller.".

The claims are not commensurate in scope with the arguments regarding the thickness of the semiconductor substrate, non-manual control of the pressing load so that a pressing load is maintained, or the ratio of the roller size to the semiconductor substrate size. Furthermore, Figure 7 and its associated description in the specification does not demonstrate or describe anything regarding non-manual pressure control of the pressing load or the ratio of the roller size

to the semiconductor size as resulting in "about 5 seconds after the roller is pressed to an area of the principal surface of the semiconductor substrate said area returns to a temperature about equal to the area's temperature prior to contact with the roller.". Figure 7 demonstrates that the limitation of "about 5 seconds after the roller is pressed to an area of the principal surface of the semiconductor substrate said area returns to a temperature about equal to the area's temperature prior to contact with the roller." is achieved when the roller, a localized heat source, is heated to 200 ^{o}C which heating temperature is expressly taught by Nagatomi et al. such that again one of ordinary skill in the art would readily expect Nagatomi et al. as modified by either one of Inada et al. or Shoffner, Da Costa, either one of Tsunashima et al. or Homma et al., and optionally Pool to meet the limitation of "about 5 seconds after the roller is pressed to an area of the principal surface of the semiconductor substrate said area returns to a temperature about equal to the area's temperature prior to contact with the roller.".

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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